DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 2, 4 and **7** are rejected under **35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 2, the recitation of a range "0.814L to 0.61L"; and

In claim 4, the recitation of a range "from **0.50** to 1/3L or from **0.25** to 1/3L"

Both claims respectively contain new subject matters because the specification does not disclose such ranges' values as currently amended in the claims.

2. **Claims 2, 4, 7** and are rejected under **35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 2 and 7, the recitation of "*a range from 0.19L to 0.39L, 0.81L to 0.61L, 0.814L to 0.61L or from 0.19L to 0.39L*" is indefinite because of the following:

According to the recitation setting *from 0.19L to 0.39L* is a narrower range, *from 0.81L to 0.61L* is a broader range, *from 0.814L to 0.61L* is a broader range, or *from 0.19L to 0.39L* is a narrower range.

A broad range together with a narrow range that falls within the broad range in the same claim is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim *from 0.81L to 0.61L* recites the broad recitation of the range, and the claim also recites *from 0.19L to 0.39L* which is the narrower statement of the range.

Similarly, **Claim 4** with the recitation of "*a range from 25L to 1/3L, from 0.50L to 1/3L, from 0.25L to 1/3L, from 0.25L to 1/3L, from 0.50 to 1/3L or from 0.25 to 1/3L*" having the same indefinite issue with range together with a narrow range that falls within the broad range in the same claim.

In claims 4-5 and 9, the recitation currently amended such as "0, π, 0 [[,]] π, 0 ~~and~~ π" is corresponding to "0, π, 0 π, 0 π" is indefinite because of the term "0 π, 0 π" does that mean from 0 to π repeatedly twice? It is very confusing.

In claims 3 and 8, each respectively recites "an axial length of said each piece of said one group of said four pieces, as said equivalent axial length, is set on the basis of 1:2:2:1" is indefinite because the claims recites an axial length of **each** piece (i.e., one single piece) of said one group of said four pieces is set to be 1:2:21, where the ratio 1:2:2:1 relates to all four pieces of said one group. Thus, it is confusing how a single piece (i.e., each piece) with only one axial length could be in a ratio for four pieces.

Should the recitation be "said four pieces of said one group having four respective axial lengths, as said equivalent axial length, being set on the basis of 1:2:2:1 ratio"?

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 2-5, 7-11, 13-15, 18-20**, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over **Uchida et al (US 5,355,044)** in view of **Okuma et al (JP-2001-359266)**, or in alternation being unpatentable over **Tsuchida et al (US 5,760,503)** in view of **Okuma et al (JP-2001-359266**.

Uchida discloses an electric motor having a rotor equipped with magnets (M) (figs 1 and 4) wherein the rotor is divided into 4 or 4n pieces (fig 1 shows 4 pieces, and fig 4 shows 8 pieces, 4 forms one group) in an axial direction, and an axial length and an electrical angle of said each piece; each group having an axial length, wherein the total axial lengths of a number of groups equal to total axial length of the rotor core or stator core, said axial direction as a X-axis, an axial center as x=0, and electromagnetic exciting force in radial and an equivalent position shifted between said pieces in a circumferential direction.

In alternation, **Tsuchida** also discloses an electric motor having a rotor equipped with magnets (M) (figs 2, and 12-14) wherein the rotor is divided into 4 pieces in an axial direction, and an axial length and an electrical angle of said each piece; each group having an axial length, wherein the total axial lengths of a number of groups equal to total axial length of the rotor core or stator core, said axial direction as a X-axis, an axial center as x=0, and electromagnetic exciting force in radial and an equivalent position shifted between said pieces in a circumferential direction, and each piece of all four divided pieces of the rotor core having equal axial length.

Uchida or in alternation **Tsuchida** each substantially discloses the claimed invention, except for the following:

(a) the core is divided into 6 or 6n pieces, as in claims 4-5 and 9, instead of 4 or 4n pieces as disclosed in the prior art.

(b) the axial length of each piece to be within a range, as set in claims 1-9;

(c) the effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π.

Okuma, however, teaches an electric motor having a rotor equipped with magnets (M) (figs 1 and 4) wherein the rotor is divided into plurality of pieces, wherein the axial length of the divided pieces of the core are different (fig 7). **Okuma** particularly teaches that the effective opening angle of the rotor is obtained by adding an angle corresponding to one slot opening to a value of integer times the slot pitch of the stator. Therefore, the rotor can be divided into a plurality of pieces, in the axial direction, and the respective divided rotor pieces are arranged circumferentially, so as the divided pieces to be shifted from each other corresponding to half a period of respective cogging torques of the divided rotor pieces.

Those skilled in the art would understand that, in order to reduce cogging torque, Okuma teaches the following:

the core can be divided into plurality of pieces, i.e., in to 4 pieces or 6 pieces or more, wherein the axial length of the divided pieces can be different or equivalent (as show in figs 5 and 7); and,

the effective opening angle of the circumferentially shifted divided core pieces is set in relation with the stator configuration and cogging torque period (as in Abstract).

Thus, by applying this important teaching of **Okuma**, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the motor by dividing the core into 6 or 6n divided pieces, wherein the divided core piece having different axial length, and arranging the divided pieces so that the effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π, as in the claimed invention. Doing so would provide the motor with maximum cogging torque reduction resulting in improving the efficient

performance thereof. Also, it would have been obvious to an artisan with necessary knowledge and skills to apply the **Okuma**'s teaching to modify the motor by determining the optimum or workable ranges of: numbers of divided core pieces; axial lengths of the divided core pieces, and the effective pole opening angles arrangement, as in the claimed invention for reducing cogging torque because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller, 105 USPQ 233.*

Regarding the math expression in claims 1-9, to one skilled in the art this would be a matter of expressing a known knowledge in terms of mathematic. *A novel and useful structure* created with the aid of knowledge of scientific truth may be patentable, in this case applying the **Okuma**'s teaching to modify the motor by determining the optimum or workable ranges of: numbers of divided core pieces; axial lengths of the divided core pieces, and the effective pole opening angles arrangement, as in the claimed invention for reducing cogging torque, while a scientific truth or the mathematical expression of it is not patentable invention. *MPEP 2106 Patentable subject matter, Mackay Radio & Telegraph Co. V. Radio Corp. Of America, 306 US 86, 94 (1939) and Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759.*

Response to Arguments

Applicant's arguments filed 5/5/08 have been fully considered but they are not persuasive.

The applicant asserts that the JP '266 document is directed to a divided rotor to reduce torque ripple. To that end, the rotor is in four pieces that move relative to the rotor's circumferential direction. Nothing is taught as relates to an axial length of each piece of the rotor, which is respectively set within a ranges from 0.19L to 0.39L, 0.81L to 0.61L, 0.81L to 0.61L or from 0.19L to 0.39L with four pieces involved. Where six pieces are involved, the axial length of each piece of the rotor in the present invention is respectively set within a range from 0.25L to 1/3L, from 0.50L to 1/3L, from 0/25L to 1/3L, from 0.25L to 1/3L, from 0.50L to 1/3L or from 0.25L to 1/3L, in order to compensate the vibration of the electromagnetic exciting force F(x) and that concept too is not disclosed or even suggested in the JP '266 document.

In response to this argument, as in previous rejection, the Examiner's position is that **Okuma** does teach an electric motor having a rotor equipped with magnets (M) (figs 1 and 4) wherein the rotor is divided into plurality of pieces, wherein the axial length of the divided pieces of the core are different (fig 7). **Okuma** teaching particularly discusses the effective opening angle of the rotor is obtained by adding an angle corresponding to one slot opening to a value of integer times the slot pitch of the stator. Therefore, the rotor can be divided into a plurality of pieces, in the axial direction, and the respective divided rotor pieces are arranged circumferentially, so as the divided pieces to be shifted from each other corresponding to half a period of respective cogging torques of the divided rotor pieces.

Thus, by applying this important teaching of **Okuma**, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the motor by **dividing the core into 6 or 6n divided pieces, wherein the divided core piece having different axial length, and arranging the divided pieces so that the effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π, as in the claimed invention. Doing so would provide the motor with maximum cogging torque reduction resulting in improving the efficient performance thereof.**

Also, it would have been obvious to an artisan with necessary knowledge and skills to apply the **Okuma**'s teaching to modify the motor by **determining the optimum or workable ranges of: numbers of divided core pieces; axial lengths of the divided core pieces, and the effective pole opening angles arrangement, as in the claimed invention for reducing cogging torque because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.** ***In re Aller, 105 USPQ 233.***

Thus, the Examiner does provide appropriate fact finding from Okuma's teaching to support rationales suggested and explain how the rationales lead to conclusion of obviousness under 35 UCS 103. The **Okuma**'s teaching does not clearly suggest the number of divided pieces and/or the different axial length, and arranging the divided pieces so that the effective pole opening angles are arranged in the circumferential direction as a phase difference of electrical angles of said neighboring pieces equivalent to 0, π , 0, and π, as in the claimed invention.

Nevertheless, an artisan with ordinary skills in the art would realize that the **Okuma** implicitly provides the teaching that the core can be divided into plurality of pieces, i.e., in to 4 pieces or 6 pieces or more, wherein the axial length of the divided pieces can be different or equivalent (as show in figs 5 and 7); and, the effective opening angle of the circumferentially shifted divided core pieces is set in relation with the stator configuration and cogging torque period (as in Abstract) for the purpose of reducing cogging torque. This is the important teaching of **Okuma**.

It has been held that the well-known Teaching-Suggestion-Motivation (TSM) test is applied in an overly rigid and formalistic way, and the TSM test is only one of a number of valid rationales that can be used to determine obviousness, and it is not the only rationale that may be relied on to support obviousness. *In re KSR International Co. vs. Teleflex Inc.*

In this instant case, the Examiner does provide valid rationales for applying the Okuma teaching within an artisan's necessary mechanical skills and ordinary knowledge to determine an optimum or workable ranges of: numbers of divided core pieces; axial lengths of the divided core pieces, and the effective pole opening angles arrangement, as in the claimed invention for reducing cogging torque because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller, 105 USPQ 233.*

Thus, the rejection does establish a *prima facie* case of obviousness.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran N. Nguyen whose telephone number is 571-272-2030 or **via email at Tran.Nguyen@USPTO.gov**

The examiner can normally be reached on 7:00 AM - 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the Examiner can be reached via email. The applicant is advised that all communications via email are unofficial, emailing is only an alternative way to establish contact with the Examiner.

If attempts to reach the examiner by telephone or email are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. (Note: **Use this Central Fax number 571-273-8300 for all official response.**)

Do **not** use the Examiner's RightFax number without informing the Examiner first because, according to the USPTO policy, any document being sent via RightFax is treated as unofficial response and will not be officially dated until it is routed to the Central Fax.

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/Tran N. Nguyen/
Primary Examiner
Art Unit 2834